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Liquid Collagen Wound Coverings Award Number N00014-90-J1797 Quarterly Report
September 10, 1991

Reports

A report of the progress of this project was presented by Ensign J.A. Scroggs, USN-MC, to a meeting of pharmaceutical industry representatives on September 5, 1991. The paper was entitled Liquid Collagen (Type I) Wound Coverings and authored by Kathleen A. Waldorf, MD and J. Peter Bentley, PhD.

Collagen Preparation

Two additional batches of atelopeptide collagen have been prepared using aseptic technique. One of them, upon quality control testing, proved to be slightly contaminated. This batch will be filtered through a 0.45 micron filter and re-precipitated prior to retesting and release for human studies.

Sterilization of Collagen Preparations

In the May 5 report we reported that the addition of DOPA to collagen prior to freeze drying protected the protein from degradation during subsequent exposure to gamma irradiation, which may be used for sterilization. We conducted a further experiment in which hypotaurine, a naturally occurring amino acid which can be easily metabolized by mammalian systems, was added to collagen prior to irradiation. Polyacrylamide gel studies and fractionation of the protein on high performance liquid chromatography systems show that this material will also protect against degradation. An application for patent protection for this discovery will be filed soon.

Human Studies

Kathleen Waldorf, MD, who has been conducting human studies on this project for this year, has left to take up a residency in plastic surgery at this institution. She is still actively involved in helping us identify appropriate patients. Richard Harding, MD, a surgery resident from the University of Georgetown Medical School, has been recruited to the project for the coming year. He has continued to apply the Iodocol preparation to split thickness skin graft donor sites with very encouraging results. Again, study patients continue to report a decrease in pain on the donor site.

In June Dr. Waldorf received approval from the human studies committee to expand the study population to include pediatric patients. We are also instituting a new procedure in which we will offer to pay patients who would volunteer to have their wounds biopsied so that histological studies on the effect of healing may be conducted.

Dr. Phillip Parshley, chief of the Oregon Burn Center at Emanuel Hospital in Portland, Oregon, is enthusiastic about participating in the project and an application is pending with

the human studies committee at that hospital for the application of our Iodocol preparation to burn patients.

Vehicle for Growth Factors

We have implanted collagen rings, crosslinked with DOPA, in rats and noted that they maintain their shape for at least 28 days. These have been harvested and studied histologically. Penetration of the implant by host cells is slow due to the high viscosity of the material. However, after 14, 21, and 28 days marked infiltration of fibroblasts can be seen, together with the deposition of host collagen within the implant. This experiment is being repeated with the collagen left in place for longer periods, and with the addition of PDGF to the implant.

Preliminary studies have been instituted using Yorkshire pigs. Dermatome wounds will be inflicted on the dorsum of the animals and Iodocol preparations containing PDGF will be applied and the rate of healing studied by biopsy after seven days.